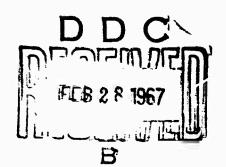CRL-67-0047

A LISP 1.5 SYSTEM FOR THE M44 COMPUTER

Paul W. Abrahams

Information International, Inc.
11161 West Pico Boulevard
Los Angeles, California 90064

Contract No. AF 19(628)-5207

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FINAL REPORT

Period Covered: 7 June 1965 through 6 January 1967

6 January 1967

Electronic Systems Division of the Air Force Systems Command
Laurence G. Hanscom Field, Bedford, Massachusetts

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AIR FORCE CAMBRIDGE RESEARCH LABORATORIES
OFFICE OF AEROSPACE RESEARCH
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ABSTRACT

This report summarizes the salient characteristics of the M44 LISP 1.5 System. The technical details of the system are described in the User's Manual and the System Manual.

A LISP 1.5 system has been constructed for the M44 digital computer operated on a time-shared basis by IBM at the Thomas J. Watson Research Center at Yorktown Heights, New York. Because the technical details of M44 LISP are fully described in the User's Manual and System Manual, this report merely briefly summarizes the salient characteristics of the system. The details will be found in these two manuals. Complete listings of the system are in the possession of cognizant technical personnel at the Air Force Cambridge Research Laboratory.

M44 LISP was produced by a bootstrapping technique using the Q32 computer at the System Development Corporation at Santa Monica, California. The system itself contains a bootstrapping facility. M44 LISP has attempted to combine the best features of the LISP 1.5 systems operating on the IBM 7094, the Univac M-460, and the Q32, but it most closely resembles the Q32 system. The facilities for operating upon list structures and upon numerical quantities are quite similar among existing systems, and have been copied in M44 LISP. The basic library of LISP functions as specified in the LISP 1.5 Manual is available within M44 LISP, though certain functions peculiar to the 7094 system have been omitted.

The area in which M44 LISP differs most markedly from the other systems (and in which they differ the most from each other) is the input-output. The unit selection mechanism is essentially that of Q32 LISP, though the M44 executive system must be used to open files. Input-Output is programmed in terms of characters, and most of the input-output programs are themselves written in LISP. The function PACK converts a list of characters to an array of characters, while the function UNPACK converts an array of characters to a list of characters. The function MOVEIN brings a single record into core in the form of an array of characters, while the function MOVEOUT writes an array of characters from core in the form of an external record. There are also two functions for converting lists of characters to numbers, and conversely.

On input, MOVEIN is used in order to bring in a record. LISP functions are then used in order to unpack and interpret it. The process is reversed on output.

The system has a total of 256K (approximately) devoted to storage of data structures. This amount is larger than any existing LISP system, though it should be recognized that at any given time, most of this memory will be virtual, i.e., in the form of a core image on disc. Though the administration of memory is performed by the executive system, it does consume time. List structures and arrays are stored in two areas that move towards each other; when they meet, a compacting garbage collector is called. The garbage collector can also be called explicitly.

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1) LIST Processing						
2) Programming Languages						
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